Dec-22-0125

ME-303 (Engineering Thermodynamics)
(ME, AE)

B.Tech-3rd (CBCS)

Time : 3 Hours   **Max. Marks : 60**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note: There are five sections A, B, C, D and E. Candidates have to attempt one question selecting from each section A, B, C & D and each question is of 10 marks. All subparts of the question in section E is compulsory.

SECTION-A

1. What is temperature scale? How is a temperature scale established? List the various properties which can be used for the measurement of temperature.

2. A mass of gas is compressed in a quasi-static process from 80 kPa, 0.1 m³ to 0.4 MPa, 0.03 m³. Assuming that the pressure and volume are related by pv^n = constant, find the work done by the gas system.

SECTION-B

3. Comment on the statement "The entropy of universe tends to maximum". What do you understand by thermal death of universe based on the above system?

4. Two kg of water at 80°C are mixed adiabatically with 3 kg of water at 30°C in a constant pressure process of 1 atmosphere. Find the increase in the entropy of the total mass of water due to the mixing process (C_p of water = 4.187 kJ/kg K).

SECTION-C

5. Clearly explain the difference between the enthalpy, external work of evaporation and internal energy of steam.

6. A reversible polytropic process, begins with steam at p_1 = 10 bar, t_1 = 200°C and ends with p_2 = 1 bar. The exponent n has the value 1.15. Find the final specific volume, the final temperature, and the heat transferred per kg of fluid.

SECTION-D

7. Show that the thermal efficiency of a regenerative cycle is always higher than that of a straight Rankine cycle regardless of where the steam is tapped off.

8. Describe Brayton cycle in detail. Derive the expression for the efficiency of Brayton cycle.

SECTION-E

9. Write short notes of the following

   a) Show the expression for finding enthalpy of pure substance in liquid and vapour region.

   b) What is reversed heat engine?

   c) Define thermodynamic equilibrium.

   d) State Zeroth law of thermodynamics

   e) Show the Brayton cycle on $p - v$, $T-S$ plot.

   f) State the vander Wall's equation of state.

   g) State the properties of ideal gas.

   h) Distinguish heat transfer and work transfer.

   i) Write Carnot's theorem and its corollaries.

   j) Show that heat transfer is path function like work transfer.

(2×10=20)